



# UNITED STATES PATENT AND TRADEMARK OFFICE

11/14

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/822,383	04/12/2004	Helmut Greim	P04,0114	2856

7590 11/14/2006

SCHIFF HARDIN LLP  
Patent Department  
6600 Sears Tower  
233 South Wacker Drive  
Chicago, IL 60606

EXAMINER

FETZNER, TIFFANY A

ART UNIT	PAPER NUMBER
----------	--------------

2859

DATE MAILED: 11/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.		Applicant(s)	
	10/822,383		GREIM, HELMUT	
	Examiner		Art Unit	
	Tiffany A. Fetzner		2859	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 02 September 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 8/28/2006 for figs 3 and 4 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>8/28/2006</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Priority*

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### *Drawings*

2. The replacement drawings of figures 3 and 4 submitted August 28<sup>th</sup> 2006 overcome the objections of June 14<sup>th</sup> 2006 Office Action.

### *Specification*

3. The amendments to the disclosure from the August 28<sup>th</sup> 2006 amendment and response are approved by the examiner and are considered to be free of new matter.

### *Response to Arguments*

4. Applicant's arguments filed 08/28/2006 have been fully considered but they are not persuasive. Applicant argues from page 12 the last paragraph through page 14 paragraph 1 that the applicant's invention as amended requires **each and all** of the states set forth in the amended independent claims to be capable of being performed although obviously not at the same time. However, a review of amended claim 1 and 8 shows that applicant's argued position is not, set forth in the claims, as argued in the remarks. Applicant has left the "or" wording in the amended claims, so the claims read as **each of** (i.e. the first limitation) or (the second limitation) or (the third limitation). Therefore the entire argument is non-persuasive.

5. Applicant then argues (i.e. on page 14 in paragraph 3) that **Misic** fails to teach the three 'switching states' or "states of operation" are each achievable, because the pin diode-switching element is a binary switching element. [See the argument of page 14 paragraph 3 through page 16 paragraph 2.] The examiner notes however that the amended claims do not require each of 'states' to be achieved by a single switch. A further detailed explanation as to how each of the "control states" are met by the **Misic** prior art of record is set forth in the final rejections which follow.

6. With respect to the argument on page 16 the last paragraph, that claim 17 cannot be met because **Misic** does not teach the subject matter of **amended independent claim 8**, this argument is considered to be non-persuasive, since the subject matter of

**amended independent claim 8** is met by the **Misic** prior art of record in the further detailed explanation, provided in the final rejections of **amended claims 1 and 8** below.

***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. **Amended Claims 1-16** are finally rejected under **35 U.S.C. 102(b)** as being anticipated by **Misic** US patent 6,040,697 issued March 21<sup>st</sup> 2000.

9. With respect to **Claim 1**, **Misic** teaches and shows "An antenna element" (i.e. component 60) "for magnetic resonance applications" [See figures 4, 5; the abstract and col. 2 line 33 through col. 7 line 43.] "comprising: a sub-section" (i.e. component 74) "extending along a section axis;" (i.e., the z-axis) "an auxiliary circuit disposed adjacent to said sub-section, said auxiliary circuit comprising a coupling section and an auxiliary circuit section;" [See auxiliary transmit coil section 72 col. 4 line 55 through col. 5 line 22], "said auxiliary circuit" (i.e. the auxiliary circuitry of coil section 72) "being inductively coupled" [See figures 4, 5, 6, 7; col. 6 line 66 col. 7 line 10, especially col. 7 lines 6-8] "to said sub-section by said coupling section" [See Figures 4-8; col. 5 lines 7-21, col. 6 line 66 col. 7 line 10, especially, col. 5 lines 18-21 and col. 7 lines 6-8] "and said auxiliary circuit section" (i.e. component 72) "proceeding parallel to said sub-section" (i.e. component 74) "at a spacing distance from said section axis;" [See figures 4 and 5.] "and said auxiliary circuit comprising controllable tuning elements each having a control state" [See the bias of PIN diodes 88; col. 5 lines 3-21; col. 6 line 36 –65], "the respective control states being selectively controllable for, ~~dependent on the respective control states, causing~~ to cause a radio frequency excitation current flowing in said sub-section to produce, at respectively different times dependent on the representative control states each of an auxiliary current in said auxiliary current section leading said excitation current" [See auxiliary transmit coil section 72 of transmit coil 68 col. 4 line 55 through col. 5 line 22; and col. 5 line 45 through col. 6 line 65 where the phase of the

Art Unit: 2859

energy/current provided to the transmit coil 68 containing auxiliary transmit coil section 72 is adjusted in voltage level and phase via phase compensator 108, the 90 degree element 104, which either 'leads' or 'lags' the phase by 90 degrees via the 90 degree displaced contact points 91] "or an auxiliary current in said auxiliary current section lagging said excitation current", [See auxiliary transmit coil section 72 of transmit coil 68 col. 4 line 55 through col. 5 line 22; and col. 5 line 45 through col. 6 line 65 where the phase of the energy/current provided to the transmit coil 68 containing auxiliary transmit coil section 72 is adjusted in voltage level and phase via phase compensator 108, the 90 degree element 104, which either 'leads' or 'lags' the phase by 90 degrees via the 90 degree displaced contact points 91] "or no auxiliary current in said auxiliary current circuit section." (i.e. when auxiliary transmit coil section 72 is decoupled from the receive coil section 74, as taught in col. 5 lines 3-22, and col. 6 lines 56-65 the state of "no auxiliary current in said auxiliary current circuit section" is provided by the **Misic** antenna structure automatically. [See also figures 4, 5; and the abstract.] Therefore all three states required by applicant's claims are met by the **Misic** reference.

10. With respect to **Amended Claim 8**, which is another corresponding equivalent version of **claim 1**, **Misic** teaches and shows "An antenna element" (i.e. component 60) "for magnetic resonance applications" [See figures 4, 5; the abstract and col. 2 line 33 through col. 7 line 43.] "comprising: a plurality of antenna elements disposed parallel to each other;" [See figures 1, 2, and 4 through 8] **Misic** also teaches and shows the remaining limitations of this claim, (i.e. that "each of said antenna elements comprising a sub-section extending along a section axis, a auxiliary circuit disposed adjacent to said sub-section, said auxiliary circuit comprising a coupling section and an auxiliary circuit section, said auxiliary circuit being inductively coupled to said sub-section by said coupling section, and said auxiliary circuit section proceeding parallel to said sub-section at a spacing distance from said section axis; and said auxiliary circuit comprising controllable tuning elements each having a control state the respective control states being selectively controllable for, ~~dependent on the respective control states, causing~~ to cause a radio frequency excitation current flowing in said sub-section to produce, at respectively different times dependent on the representative control

**states each of** an auxiliary current in said auxiliary current section leading said excitation current, or an auxiliary current in said auxiliary current section lagging said excitation current, or no auxiliary current in said auxiliary current section" for the same reasons that were already set forth in the **final rejection of claim 1**. [See the **final rejection of claim 1** above] The same reasons for rejection, that apply to **claim 1** also apply to **claim 8** and need not be reiterated.

11. With respect to **Claim 2**, and corresponding **claim 9**, **Misic** teaches and shows "said coupling section is a component of said sub-section." [See figures 4 and 5] The same reasons for rejection, that apply to **claims 1, 8** also apply to **claims 2, 9** and need not be reiterated.

12. With respect to **Amended Claim 3**, and corresponding **Amended claim 10**, **Misic** shows "said coupling section is a separate **different** element from said sub-section." [See figures 6 and 7] The same reasons for rejection, that apply to **claims 1, 8** also apply to **claims 3, 10** and need not be reiterated.

13. With respect to **Amended Claim 4**, and corresponding **Amended claim 11**, **Misic** teaches and shows "said sub-section is a first sub-section, said auxiliary circuit is a first auxiliary circuit, said coupling section is a first coupling section, said auxiliary circuit section is a first auxiliary circuit section, and said controllable tuning elements are first controllable tuning elements", because **Misic** also teaches and shows "wherein said antenna element further comprises: a second sub-section axially offset from said first sub-section;" [See inner coil arrangement section 64 of figures 4, and 5; the abstract and col. 2 line 33 through col. 7 line 43.] "a second auxiliary circuit adjacent to said second sub-section;" [See figures 4 and 5 as rods 66 may have adjustable tuning capacitors, or variable capacitors. See also col. 6 line 36 through col. 7 line 43.] "said second auxiliary circuit comprising a second coupling section and a second auxiliary circuit section; said second auxiliary circuit being inductively coupled to said second sub-section by said second coupling section, and said second auxiliary circuit section proceeding parallel to said second sub-section at a spacing **distance** from said section axis; said second auxiliary circuit comprising second controllable tuning elements each having a control state the respective control states being selectively controllable for,

Art Unit: 2859

~~dependent on the respective control states, causing to cause~~ a radio frequency excitation current flowing in said sub-section to produce, at respectively different times dependent on the representative control states each of an auxiliary current in the second auxiliary circuit section leading said excitation current in the second sub-section, or an auxiliary current in the second auxiliary current section lagging the excitation current in the second sub-section, or no auxiliary current in the second auxiliary current section." [See figures 4 through 8, the abstract and col. 1 line 4 through col. 7 line 43, where all the connections are set forth in detail. Inner coil section 64 is similar in construction to outer coil 68 and is inside the outer coil during operation of the MRI device. Additionally contacts 93 enable the phase of the 90 degree element 104 from the phase compensator 108 to be applied in a similar manner to coil section 64 as was done to coil section 68, therefore an energy voltage / current phase offset of 90 degrees which may either lead, lag, or be non-existent when decoupled, (i.e. each of applicant's 'states' depending on what location and point in time is used for reference exists, within the auxiliary current section taught by the **Misic** reference, which makes the arguments noted earlier non-persuasive.) The same reasons for rejection, that apply to **finally claims 1, 8** also apply to **claim 4, 11** and need not be reiterated.

14. With respect to **Claim 5**, and corresponding **claim 12**, **Misic** teaches and shows "said first and second auxiliary circuits are inductively decoupled from each other." [See figures 4-8; and col. 4 line 36 through col. 7 line 43.] The same reasons for rejection, that apply to **claims 1, 4, 8, 11** also apply to **claims 5, 12** and need not be reiterated.

15. With respect to **Claim 6**, and corresponding **claim 13**, **Misic** teaches and shows "said first and second auxiliary circuits have an overlapping region." [See figures 4-8; and col. 4 line 36 through col. 7 line 43. The examiner notes that in operation since the inner coil, is inside the outer coil, there is an intrinsic overlapping region. See also col. 3 lines 32-49.] The same reasons for rejection, that apply to **claims 1, 4, 5, 8, 11, 12** also apply to **claims 6, 13** and need not be reiterated.

16. With respect to **Claim 7**, and corresponding **claim 14**, **Misic** teaches and shows "wherein said second controllable tuning elements are selectively controllable independently of said first controllable tuning elements, because each of the conductive

Art Unit: 2859

rods 66, 82, and 84 of coil array 60 may have its own individual adjustable tuning capacitor," [See col. 5 line 3 through col. 7 line 43; especially col. 5 lines 3-4 and col. 6 lines 36-47.] The same reasons for rejection, that apply to **claims 1, 4, 8, 11** also apply to **claims 7, 14** and need not be reiterated.

17. With respect to **Claim 15**, **Misic** teaches and shows "each of said antenna elements is rod-shaped, and wherein said antenna elements are disposed around an arrangement axis." [See figures 1, 2, and 4 through 8; col. 3 line 12 through col. 7 line 43; especially col. 4 line 55 through col. line 47.] The same reasons for rejection, that apply to **claims 1, 8** also apply to **claim 15** and need not be reiterated.

18. With respect to **Claim 16**, **Misic** teaches and shows that "each of said antenna elements has opposite ends", [See figures 1, 2, and 4 through 8; col. 3 line 12 through col. 7 line 43]; "and wherein said antenna arrangement further comprises two" rings (i.e. 'ferrules' (i.e. the external loops added to the arrangement, or rings 70a, 70b, 80a, 80b, or 80c) "respectively disposed at the opposite ends of the antenna elements coupling said antenna elements with each other." [See figures 1, 2, and 4 through 8; col. 3 line 12 through col. 7 line 43]. The same reasons for rejection, that apply to **claims 1, 8, 15** also apply to **claim 16** and need not be reiterated.

### ***Claim Rejections - 35 USC § 103***

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

20. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.



21. **Claim 17** is **finally** rejected under **35 U.S.C. 103(a)** as being unpatentable over **Misic** US patent 6,040,697 issued March 21<sup>st</sup> 2000; as applied to **claims 1, 8, and 15** above, and further in view of **Srinivasan** US patent 6,850,064 B1 issued Feb. 1<sup>st</sup> 2005, filed November 22, 2000 with an effective US priority date of November 24<sup>th</sup> 1999.

22. With respect to **Claim 17**, **Misic** teaches and shows that "each of said antenna elements has opposite ends", [See figures 1, 2, and 4 through 8; col. 3 line 12 through col. 7 line 43]; **Misic** lacks directly teaching or showing that "said antenna arrangement comprises a radio-frequency shield surrounding said antenna elements, and a plurality of capacitors coupling the respective antenna elements to said radio-frequency shield at said opposite ends." However, **Srinivasan** shows in figure 9 an RF shield surrounding an RF coil antenna configuration, which like **Misic** is comprised of parallel component sections and auxiliary circuitry. [See **Srinivasan figures 9-15**. The examiner notes that figures 1a, 2a, 3a and 4a of **Srinivasan**, which show the basic premise of the 1997 filed **Misic** invention, are identified as PRIOR ART by **Srinivasan**, and that Figure 3a is taught by **Srinivasan**, as being the work of **Misic** in col. 3 line 64 through col. 4 line 5. Additionally figure 12 of **Srinivasan** shows the cavity, TEM, birdcage resonator of the **Srinivasan** invention is connected to an RF shield through capacitors c1 at opposite ends. See Figures 9 and 12 in combination with figures 1a through 8b, 10, 11 and figures 12-15. See additionally the disclosure]

23. It would have been obvious to one of ordinary skill in the art at the time that the invention was made to modify the teaching of **Srinivasan** with the teaching of **Misic** because the **Srinivasan** invention teaches that the RF coil configuration set forth, is drawn from the earlier works of inventors that include **Misic** as noted in the text of the **Srinivasan** reference with respect to the **Misic** coil configuration of figure 3a, and figure 4a of the prior art. Additionally the use of an RF shield around an RF antenna is commonly utilized for the purpose of reducing noise and increasing the signal to noise ratio of the detected signals, by preventing other sources of noise from being picked up by the antenna configuration. The same reasons for rejection, that apply to **finally rejected amended claims 1, 8, 15** also apply to **claim 17** and need not be reiterated.

Art Unit: 2859

24. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

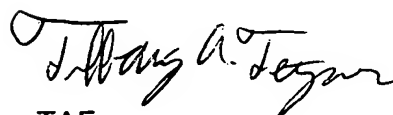
25. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

#### Conclusion

26. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tiffany Fetzner whose telephone number is: (571) 272-2241. The examiner can normally be reached on Monday-Thursday from 7:00am to 4:30pm., and on alternate Friday's from 7:00am to 3:30pm.

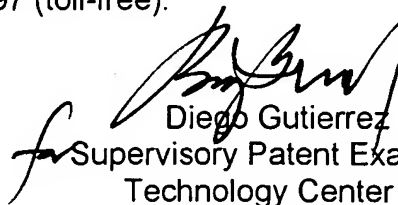
27. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez, can be reached at (571) 272-2245. The **only official fax phone number** for the organization where this application or proceeding is assigned is **(571) 273-8300**.

28. Information regarding the status of an application may be obtained from the Patent Application information Retrieval (PAIR) system Status information for published applications may be obtained from either Private PMR or Public PMR. Status information for unpublished applications is available through Private PMR only. For more information about the PMR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PMR system contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



TAF

November 8, 2006



Diego Gutierrez 11.9.06  
for Supervisory Patent Examiner  
Technology Center 2800